b. 4-wire Loops

(i) Positions of the Parties

334. AT&T/WorldCom derive the 4-wire loop rate by multiplying the 2-wire loop rate by a factor of 1.7. To arrive at this factor, AT&T/WorldCom adjust the basic 2-wire loop costs by: (1) increasing the NID costs to account for an additional overvoltage protector ($0.03 per month increase in the NID costs); (2) doubling distribution costs to account for the second 2-wire pair; (3) doubling the SAI costs; and (4) increasing total DLC costs by 40 percent.[857] Fiber feeder costs remain unchanged.[858]

335. Verizon contends that these adjustments to the 2-wire loop costs fail to capture the cost differences between the 2-wire loop and the 4-wire loop. First, because AT&T/WorldCom start with their proposed costs for the 2-wire loop, the 4-wire loop costs incorporate all the errors that Verizon attributes to the 2-wire loop costs.[859] Second, Verizon asserts that AT&T/WorldCom compound this problem by making additional errors specific to the 4-wire loop. For example, because 4-wire services generally are provisioned to businesses that have inside terminals instead of NIDs, AT&T/WorldCom inappropriately factor in higher NID costs rather than using the costs of the necessary inside terminals.[860] Verizon also claims that DLC costs should be increased by a factor of four, rather than 40 percent, to account for the additional DLC equipment necessary because, unlike 2-wire loops, 4-wire loops are unable to take advantage of GR-303 DLC concentration capabilities.[861] Finally, Verizon argues that AT&T/WorldCom fail to increase the component common equipment cost allocation by the two to four times necessary to account for the additional plug-in shelves that 4-wire loops require[862] and fail to propose deaveraged rates.[863]

336. AT&T/WorldCom respond that Verizon's contentions are misplaced. First, they claim that they properly establish the 2-wire loop costs.[864] Second, they point out that Verizon's own cost study uses a NID to calculate 4-wire loop costs.[865] Third, they contend that the 2-wire loop costs they propose do not include the concentration functionality, thus there is no need to account for

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857 AT&T/WorldCom Ex. 1, at 23-24; AT&T/WorldCom Ex. 23, Vol. 1 at 10-11, Attach. J.

858 AT&T/WorldCom Ex. 1, at 24; AT&T/WorldCom Ex. 23, Vol. 1 at 11.

859 Verizon Ex. 109, at 38-39; Verizon Reply Cost Brief at 145.

860 Verizon Ex. 109, at 40.

861 *Id.* at 40-42.

862 *Id.*; *see also* Verizon Reply Cost Brief at 145.

863 Verizon Ex. 109, at 42.

864 AT&T/WorldCom Ex. 14, at 49.

865 *Id.* at 50; AT&T/WorldCom Initial Cost Brief at 167-68.

need not be replaced over the life of the switch.[1027] Finally, the SCIS model user guide indicates that the "getting started" costs for the switch technology in the Verizon study that accounts for most of the investment and most of the lines are independent of both usage and the number of lines.[1028]

392. Verizon does provide examples of components of the "getting started" equipment that it has replaced or augmented over the life of the switch.[1029] Verizon fails, however, to provide empirical evidence to quantify the extent to which it has grown or replaced the "getting started" components of the switch. It does not, for example, provide any evidence to support an estimate of the percentage of overall investment in the "getting started" components of a modern switch that would be installed initially and the percentage that would be installed subsequent to the initial installation date. These examples therefore do not undermine the other record evidence that supports the conclusion that the new switch discount is appropriate for estimating the "getting started" investment.

393. Moreover, whatever the extent to which "getting started" equipment is replaced or augmented, Verizon acknowledges that a primary reason for doing so is to upgrade the switch, not to accommodate growth, especially for the Lucent 5ESS switch, which comprises the majority of Verizon's switch investment.[1030] To the extent that "getting started" equipment is augmented or replaced for reasons other than growth, use of a discount other than the new switch discount to develop "getting started" investment would result in rates that recover from current subscribers costs for future upgrades from which they receive no benefit today.

394. Finally, Verizon's experience with regard to replacing or augmenting "getting started" equipment derives in part from switches that were installed many years ago and that have had lives exceeding those that may be expected for a modern digital switch installed today, the starting point for developing forward-looking costs. That is, a switch installed today may never reach the age of a number of Verizon's existing switches. We recognize that a modern digital switch installed today may have a relatively shorter life by prescribing a 12-year switch life as the basis for calculating depreciation expense.[1031] This 12-year life is at the low end of the Commission's safe-harbor range and likely is shorter than one that we would have prescribed for developing unbundled switching prices several years ago. Given that a digital switch installed today would have a shorter life than one installed years ago, we also would expect that

[1027] *Id.*

[1028] AT&T/WorldCom Ex. 24P (Pitts Supplemental Surrebuttal), at 16-17 (confidential version); *see also* Verizon Ex. 123, at 6 (stating that SCIS models "the investment for processor-related equipment and other equipment independent of switch size (*i.e.*, lines and trunks) and traffic").

[1029] Verizon Ex. 122, at 175.

[1030] *Id.* at 178; Tr. at 5434-38, 5440-41 (for example, carriers might add processing capacity over time to run application software that supports advanced features or to accommodate new regulatory mandates, such as LNP).

[1031] *See supra* section III(D)(3).

c. DS-1 and DS-3 Loops

(i) Positions of the Parties

338. AT&T/WorldCom calculate DS-1 and DS-3 loop costs by determining the cost relationship between these loops and the basic 2-wire loop.[871] To do so, they first determine, based on Verizon ARMIS data,[872] that the average number of DS-0 equivalents per physical, non-switched DS-1 and DS-3 lines is approximately 8.0.[873] Because the 8:1 ratio includes a mix of DS-1s and DS-3s, AT&T/WorldCom then determine the ratios for DS-1s and DS-3s individually.[874] Relying on the Commission's *Transport Rate Structure Order*, AT&T/WorldCom assume that the DS-3:DS-1 cost ratio is 9.6:1.[875] AT&T/WorldCom also assume that 90 percent of non-switched lines are DS-1s and 10 percent are DS-3s.[876] Applying these two relationships, AT&T/WorldCom calculate DS-1 costs to be 4.3 times DS-0 costs and DS-3 costs to be 41.3 times DS-0 costs (*i.e.*, 9.6 times DS-1 costs).[877]

339. Verizon urges us to reject AT&T/WorldCom's DS-1 and DS-3 loop cost calculations. Verizon contends that AT&T/WorldCom improperly use a different DS-0 equivalent factor in determining the DS-1 and the DS-3 loop rates than they use to determine the 2-wire loop rates. Specifically, AT&T/WorldCom use a 12:1 DS-0 to DS-1 ratio and a 9.6:1 DS-3 to DS-1 ratio to determine DS-1 and DS-3 loop costs, while using a 24:1 DS-1 to DS-0 ratio and a 28:1 DS-3 to DS-1 ratio in their proposed DS-0 loop cost calculations.[878] Verizon also asserts that AT&T/WorldCom fail to provide support for their 12:1 DS-1 to DS-0 ratio or their 9:1 ratio of DS-3s to DS-1s,[879] and that they fail to account for sufficient investment for DS-1 electronics.[880] Finally,

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[871] AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[872] AT&T/WorldCom claim that they rely on 2002 ARMIS data. *See* AT&T/WorldCom Ex. 1, at 25 n.28; AT&T/WorldCom Ex. 23, Vol. 1 at 12 n.8. ARMIS data for 2002 (and 2001) were not available at the time of the hearing. We believe it likely that, if AT&T/WorldCom relied on ARMIS data, they used 2000 ARMIS data, and assume so in our analysis.

[873] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[874] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[875] *See Transport Rate Structure and Pricing*, CC Docket No. 91-213, Third Memorandum Opinion and Order on Reconsideration, 10 FCC Rcd 3030, 3039, 3049, 3062, paras. 13, 33-34, 62-63 (1994) (*Transport Rate Structure Order*).

[876] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 12.

[877] AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 12. Specifically, AT&T/WorldCom's formulas are: (90% * 4.3) + (10% * 4.3 * 9.6) = 8. (4.3 * 9.6) = 41.3. In the first formula, AT&T/WorldCom solve for the 4.3. AT&T/WorldCom Ex. 1, at 26 n.29.

[878] Verizon Ex. 109, at 42-44; Verizon Reply Cost Brief at 138-40.

[879] Verizon Ex. 109, at 43-44.

[880] *Id.* at 37.

387. Accordingly, as a threshold matter, we conclude that TELRIC-based switch costs should reflect switch manufacturer prices for both new equipment and growth equipment; therefore, we reject both Verizon's proposed discount (based largely on growth additions) and AT&T/WorldCom's proposed discount (based entirely on new switch purchases). This limited departure from baseball arbitration is consistent with Commission precedent regarding switch discounts in the context of section 271 applications. Upon consideration of arguments similar to those presented here, the Commission found that an assumption of 100 percent growth additions is inconsistent with TELRIC principles, but it also rejected arguments that the TELRIC rules require an assumption of 100 percent new switches.[1015]

388. In order to implement this conclusion, we require Verizon to use in the SCIS model three separate vendor discounts to model costs attributable to end-office switching, as set forth in sections V(C)(1)(b)(i)(a), V(C)(1)(b)(ii)(a), and V(C)(1)(b)(iii), below. First, we will use the discounts that Verizon currently receives on new switches in order to calculate "getting started" investment.[1016] Second, we will use a weighted average discount reflecting Verizon's current discount on new switches and growth equipment in order to estimate switch investment other than "getting started," trunk port, and SS7 link investment. Third, we will use a separate discount for end-office switching investment attributable to trunk ports and SS7 links.

389. We must also develop vendor discounts for new switches and growth equipment for use in the SCIS model to develop tandem switching costs. Based on the record before us, we conclude that the appropriate discounts for tandem switching costs are similar to the discounts for end-office switching.[1017] For tandem switching, however, we conclude that we need only two discounts. We will use the discounts that Verizon currently receives on new switches for tandem switching "getting started" investment. We will use a weighted average discount reflecting Verizon's current discounts on new switches and growth equipment for estimating tandem switch investment, other than "getting started" investment.

(Continued from previous page)
Alabama, Kentucky, Mississippi, North Carolina, and South Carolina, WC Docket No. 02-150, Memorandum Opinion and Order, 17 FCC Rcd 17595, 17635, para. 83 (2002) (*BellSouth Multistate 271 Order*) (levels of new and growth switch discounts reflect vendors' judgments about anticipated purchases); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059, para. 81 (vendor discounts are valid only when an overall purchase of both new and growth equipment is made).

[1015] *See, e.g., Rhode Island 271 Order*, 17 FCC Rcd at 3318, para 34 (The Commission "strongly question[ed]" an assumption of 100 percent growth additions. "Although an efficient competitor might anticipate some growth additions over the long run, rates based on an assumption of all growth additions and no new switches do not comply with TELRIC principles."); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059-60, para. 82 (rejecting AT&T's claim that the use of a mix of new and growth switch purchases in a cost model may never be used to determine forward-looking costs, because it may not be cost-effective to acquire all of the projected need at the outset).

[1016] As we explain *supra* note 988, the "getting started" equipment is the central processor, memory, maintenance, administrative, test, and spare equipment, and other common equipment.

[1017] *See, e.g.,* Verizon Ex. 107, at 194.

rates (from the LCAM) are similar to those they propose. Specifically, using Verizon's proposed statewide average 2-wire, DS-1, and DS-3 loop rates, the ratios are 6.1 and 10.0, respectively. In addition, in the *Access Charges Reform First Report and Order*, the Commission found that the ratio of outside plant (*i.e.*, loop) costs for PRI ISDN lines[889] to basic analog lines was approximately 5 to 1.[890] The Commission based this determination on cost studies submitted by Bell Atlantic, Ameritech, Pacific Bell, and US West.[891] The Bell Atlantic study (which included Virginia) alone, moreover, showed a 4.13 to 1 ratio.[892]

343. Because we are using the MSM to generate 2-wire loop rates,[893] we do not consider using the LCAM to establish DS-1 loop rates or the Verizon High Capacity Access Cost (Hi-Cap) model to establish DS-3 loop rates. The MSM and the LCAM and Hi-Cap models are fundamentally different models that use widely varying assumptions and inputs that are not possible to reconcile with any reasonable degree of confidence. Using these different models to determine the costs of different loop types would, therefore, invariably result in Verizon either over- or under-recovering its total outside plant costs, and thus violate the Commission's TELRIC rules.[894]

344. Although we use AT&T/WorldCom's cost factors to determine the DS-1 and the DS-3 loop rates, we agree with Verizon that AT&T/WorldCom create total cost and cost allocation problems by using different DS-0 equivalent computations (4.3:1 and 9.6:1) to determine DS-1 and DS-3 loop rates than they use to determine the DS-0 loop rates (24:1 and 28:1). As we explain in

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[889] We assume, for purposes of this arbitration, that PRI ISDN loop costs and DS-1 loop costs are the same because Verizon submits a single cost study, establishing a single set of rates, for DS-1 loops and for PRI ISDN loops. For this same reason, although AT&T/WorldCom do not offer testimony specific to PRI ISDN loop costs, we find that the rates for the PRI ISDN type loop shall be the same as those we establish herein for the DS-1 loop type.

[890] *See Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 91-213, 95-72, First Report and Order, 12 FCC Rcd 15982, 16028-34, paras. 111-22 (1997) (*Access Charge Reform First Report and Order*) (using this cost ratio to cap at 5 the number of end-user common line charges (*i.e.*, subscriber line charges or SLCs) that may be assessed by price cap carriers for a PRI ISDN service). The Commission relied on this decision in extending the rule to non-price cap carriers in 2001 in the MAG Order. *Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, CC Docket Nos. 00-256, 96-45, 98-77, 98-166, Second Report and Order and Further Notice of Proposed Rulemaking in CC Docket No. 00-256, Fifteenth Report and Order in CC Docket No. 96-45, and Report and Order in Docket Nos. 98-77 and 98-166, 16 FCC Rcd 19613, 19640-41, para. 56 (2001) (*MAG Order*).

[891] *Access Charge Reform First Report and Order*, 12 FCC Rcd at 16030-33, paras. 113-20. The Commission excluded the cost study submitted by NYNEX, which showed a higher ratio, because it was determined to be an outlier. *Id.* at 16030-31, para. 113.

[892] *Id.* at 16030-31, para. 113.

[893] *See supra* section IV(B)(2).

[894] *See* 47 C.F.R. § 51.505(a-b).

382. Verizon states that its proposed switching costs properly reflect the best available estimate of the discounts that Verizon would receive as it incrementally upgrades and expands its network and that they are therefore appropriate for use in determining its forward-looking switching costs.[1002] Verizon bases the discount it uses in the SCIS model for the Lucent 5ESS switch and the Siemens EWSD switch on the discount it received on year 2000 purchases.[1003] It bases the discount for the Nortel DMS-100 and DMS-200 switches on the discount reflected in its current contract with Nortel and the purchases Verizon expects to make under this contract.[1004] Verizon's proposed discounts reflect almost entirely the discounts it receives on additions to existing switches (the "growth discount," as opposed to the "new switch discount"), because the purchases on which the proposed discounts are based are almost entirely for switch growth and upgrade equipment.[1005] Verizon argues that AT&T/WorldCom's proposed all-new switch discount is unrealistic and has been previously rejected by this Commission, the D.C. Circuit, and state commissions as inconsistent with TELRIC principles.[1006]

383. AT&T/WorldCom argue that the Commission's TELRIC pricing rules require the use of the most efficient technology and thus assume the deployment of new switching equipment.[1007] Therefore, they argue that the new switch discount is the appropriate discount for calculating the cost of this equipment.[1008] Furthermore, although the discounts that vendors give for purchasing a new switch historically have been greater than the discounts for add-on equipment or growth to an existing switch, AT&T/WorldCom assert that, more recently, Verizon has filed testimony in a variety of proceedings stating that the discounts it now receives for growth equipment have deepened and are roughly the same as the discounts for a new switch.[1009] Thus, AT&T/WorldCom argue that it is reasonable to rely entirely on new switch discounts when developing switch costs in this proceeding.

384. In contrast to the extensive record developed concerning end-office switching, the

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[1002] Tr. at 5230, 5235; Verizon Switching Cost Brief at 4. Verizon's proposed discounts and supporting data for the Lucent 5ESS switch and Nortel DMS-100 and DMS-200 switches are set out in its cost studies. *See* Verizon Ex. 100P, Vol. IX, Tab VA Switch Discount Support, Exhibit Part C-P1 and Part C-P2 (confidential version). Its proposed discount and supporting data for the Siemens EWSD switch are set out in Verizon Ex. 122P (Recurring Cost Panel Surrebuttal), Attach. O (confidential version).

[1003] Verizon Ex. 122, at 166-67.

[1004] *Id.* at 167.

[1005] *See id.*; Verizon Ex. 125P, Attach. D (confidential version); Verizon Ex. 212P (Verizon response to record request no. 28 (requested Nov. 28, 2001)) (confidential version).

[1006] Verizon Switching Cost Brief at 6-7, 9-10 (citing *AT&T Corp. v. FCC*, 220 F.3d at 618).

[1007] AT&T/WorldCom Switching Cost Brief at 5-7; AT&T/WorldCom Reply Cost Brief at 82.

[1008] AT&T/WorldCom Switching Cost Brief at 6-7; AT&T/WorldCom Reply Cost Brief at 82.

[1009] AT&T/WorldCom Reply Cost Brief at 82.

or 4-wire digital data services (DDS) loop types. Verizon proposes to establish rates for these loop types using its loop cost studies.[900] Other than providing general descriptions of these loop types,[901] Verizon fails to offer any testimony or other evidence to explain its cost studies for these loop types or to support the inputs and assumptions reflected therein. AT&T/WorldCom do not offer any affirmative proposal to establish rates for these loop types. They provide detailed testimony challenging many of the inputs and assumptions used by Verizon in its LCAM study generally, which apply to all loop types, but they do not offer any challenges specific to these loop types.[902]

b. Discussion

350. Neither Verizon nor AT&T/WorldCom offer feasible proposals to establish TELRIC rates for these loop types. Both proposals rely on the LCAM, and, as we explain below, using the LCAM to establish rates for the 2-wire CSS, 2-wire ISDN BRI, and 4-wire DDS loops presents significant problems. To avoid these problems, we adopt rates for these loops based on cost ratios (as opposed to absolute values) derived from the LCAM.

351. Relying on the LCAM (including its inputs and model algorithms) for these three loop types, as the parties suggest, while using the MSM (including its inputs and model assumptions) as the basis to establish rates for other loop types admittedly raises significant issues regarding data mismatches. Simply put, the cost inputs and algorithms vary greatly between the cost models. The parties fail to provide sufficient evidence to enable us to resolve these problems. Neither side devotes any significant testimony or briefing to issues specific to these loop types. Verizon includes a skeletal summary of what these loop types are, and AT&T/WorldCom include a single paragraph of testimony that points the reader to their workpapers.[903] In order for us to establish rates for these loop types, we would therefore need to modify the LCAM to ensure its consistency with the MSM without any meaningful assistance from the parties. This we decline to do.

352. We note, moreover, that we do not expect there to be any significant demand for at least the 2-wire CSS and 4-wire DDS loops. These two loop types represent very old technologies. CSS should be necessary only where signaling system 7 (SS7) networks have not been deployed. DDS lines should be necessary only to support certain very old and slow modems (*e.g.*, early digital 2400 kbps modems). Arguably, because neither of these loop types represents the most efficient technology currently available, we should not be establishing separate rates for these loop types.

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[900] *See* Verizon Ex. 100P, Vols. II-III, Parts B-2 (2-wire CSS), B-4 (2-wire ISDN BRI), and B-5 (4-wire DDS) (confidential version).

[901] Verizon Ex. 107, at 81-82.

[902] *Compare* AT&T/WorldCom Ex. 12, at 19-79, *with* AT&T/WorldCom Ex. 12, at 94-95.

[903] Verizon Ex. 107, at 81-82; AT&T/WorldCom Ex. 12, at 95-96. Although AT&T/WorldCom attempt to restate all of Verizon's loop rates, they acknowledge that they have not proposed all of the necessary adjustments. *See* AT&T/WorldCom Ex. 12, at 10, 12, 16, 19, 36.

the number of lines by four) in this allocation.[993] They also contend that SS7 link investments are limited to trunks and therefore should be allocated based on the relative number of end-office trunk ports and tandem trunk ports.[994]

2. Discussion

377. We adopt Verizon's approach to allocating costs that are shared between end-office and tandem switching functions. As a preliminary matter, we note that the effect of using AT&T/WorldCom's proposed allocation factors instead of Verizon's would be fairly minimal. AT&T/WorldCom estimate that use of their allocation factors would reduce Verizon's end-office switch costs by only four percent.[995]

378. Verizon's approach is preferable for several reasons. First, as we explain *infra* in the end-office switching rate structure section, we require Verizon to recover end-office switching costs, including "getting started," EPHC, and SS7 link costs, on a flat, per line basis, and not on a per MOU basis.[996] Any "getting started," EPHC, and SS7 link costs shared between tandem and end-office switch functions that are allocated to tandem switching would, however, under the parties' proposed tandem rate structures, be recovered on a per MOU basis. Second, recovery of these shared costs through either element will permit total element cost recovery and should not affect the total payments made by competitive LECs. Because the shared costs that AT&T/WorldCom propose allocating to tandem switching would equal precisely the shared costs that would be allocated away from end-office switching, and because we expect that competitive LECs that purchase unbundled end-office switching are also likely to purchase unbundled tandem switching, competitive LEC payments for these two switching elements

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[992] Line concentration enables a LEC to reduce the number of DS-1 feeder facilities necessary by assigning a feeder transmission path as a telephone call is made instead of dedicating a specific channel in the feeder plant to a particular line at all times. *See* Verizon Ex. 122, at 183-85; Verizon Switching Cost Brief at 14. Concentration is possible because not all callers use the telephone at the same time.

[993] AT&T/WorldCom Ex. 24, at 12 n.18. In their restatement of the Verizon studies, AT&T/WorldCom allocate "getting started" and EPHC investments to end-office switching and tandem switching, respectively, based on the following formulas: ((lines/4) + local trunks)/((lines/4) + local trunks + tandem trunks) and tandem trunks/((lines/4) + local trunks + tandem trunks). They apply these allocation factors to 5ESS end-office switch and combined end-office/tandem switch investment. They do not apply these factors to Nortel or Siemens switch investment because none of the Nortel or Siemens switches is a combined end-office/tandem switch. *Id.*; *see also infra* section V(C)(3).

[994] AT&T/WorldCom Ex. 24, at 12 n.18. In their restatement of the Verizon studies, AT&T/WorldCom allocate SS7 link investments to end-office switching and tandem switching, respectively, based on the following formulas: local trunks/(local trunks + tandem trunks) and tandem trunks/(local trunks + tandem trunks). They apply these allocation factors to 5ESS end-office switch and combined end-office/tandem switch investment. They do not apply these factors to Nortel or Siemens switch investment because none of the Nortel or Siemens switches is a combined end-office/tandem switch. *Id.*

[995] *See id.* at 12.

[996] *See infra* section V(D).

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W CSS/2W BUL	Verizon 2W CSS/2W BUL	% Difference Between ratios
2W BUL			2W CSS					
Cell 1	**4.98**	**17.86**	**Cell 1**	**7.00**	**25.85**	***1.41***	***1.45***	***2.9%***
Cell 2	7.37	26.31	Cell 2	9.49	34.50	*1.29*	*1.31*	***1.8%***
Cell 3	11.77	43.45	Cell 3	13.71	50.95	*1.16*	*1.17*	***0.7%***
AVG.:	6.18	22.33	AVG.:	8.20	30.28	*1.33*	*1.36*	***2.2%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W BRI/2W BUL	Verizon 2W BRI/2W BUL	
2W BUL			2W BRI					
Cell 1	4.98	17.86	Cell 1	5.91	23.14	*1.19*	*1.30*	***8.4%***
Cell 2	7.37	26.31	Cell 2	8.28	31.83	*1.12*	*1.21*	***7.1%***
Cell 3	11.77	43.45	Cell 3	12.65	48.87	*1.07*	*1.12*	***4.4%***
AVG.:	6.18	22.33	AVG.:	7.09	27.66	*1.15*	*1.24*	***7.4%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 4W DDS/4W CSS	Verizon 4W DDS/4W CSS	
4W BUL - CSS			4W DDS					
Cell 1	*19.69*	*56.81*	*Cell 1*	*21.77*	*60.29*	*1.106*	*1.061*	***-4.2%***
Cell 2	24.80	74.19	Cell 2	27.52	78.99	*1.110*	*1.065*	***-4.2%***
Cell 3	32.55	106.49	Cell 3	36.14	113.18	*1.110*	*1.063*	***-4.5%***
AVG.:	22.01	65.50	AVG.:	24.37	69.67	*1.107*	*1.064*	***-4.1%***

355. By way of example, if we apply the ratio analysis and use the ratios generated from the Verizon proposed rates, we would calculate the 2-wire CSS loop rate (see first line of the table above, in bold) for zone 1 by multiplying the basic 2-wire loop rate, zone 1, by 1.45. Were we instead to use the ratios generated from the AT&T/WorldCom restatement rates, we would use a ratio of 1.41 instead of 1.45. In this instance, using the ratio based on the Verizon proposed rates instead of the AT&T/WorldCom restatement rates would generate a 2.9 percent higher 2-wire CSS loop rate (for zone 1).

356. To complete this analysis, we must determine whether to use the ratios generated from the Verizon proposed rates or the AT&T/WorldCom proposed restatement rates. Electronics costs comprise a significant proportion of loop costs, and one of the major cost drivers for electronics is the type of DLC systems used. In determining basic 2-wire loop costs, we concluded that fiber-based loop feeder plant should use 100 percent NGDLC systems.[907] Because we adopt AT&T/WorldCom's position on that issue, and because electronics are a significant loop cost driver, we will use the ratios that result from the AT&T/WorldCom restatement rates rather than from the Verizon proposed rates. In reaching this conclusion, we note that the difference between the AT&T/WorldCom and Verizon ratios (the last column in the table, above) is generally small (less than five percent for all three loop types in all density zones, except for the 2-wire ISDN BRI loop type in zones 1 and 2). We further note that,

[907] *See supra* section IV(C)(2)(k).

concluded that the Verizon cost study is superior to the MSM for calculating unbundled switching costs, we place less weight on the relative simplicity of the MSM's Switching/Transport module. Similarly, concerns expressed in the universal service proceeding regarding the SCIS model's use of proprietary data do not arise here.[975] In this proceeding, AT&T/WorldCom and Bureau staff have had access to the Verizon study and its underlying data. Indeed, AT&T/WorldCom were able to re-run the Verizon switching cost study using different input data and thereby to propose restated switching rates.[976]

373. Finally, we have considered the effects of adopting the MSM for loop rates and the Verizon cost study for switching rates and believe that doing so is reasonable in the circumstances before us. In contrast to the relative cost analysis performed in the universal service proceeding, here the TELRIC rules require that we establish rates for each UNE, including switching, based on the costs attributable to that UNE.[977] Rates for a particular UNE are based on the total costs of the element divided by the total demand for the element.[978] Consistency between assumptions and data for the costs and the demand of a particular element is, therefore, crucial to determining the per unit costs of that element. Identity of model assumptions and data between different elements is not essential so long as they otherwise meet our key model criteria. Neither side, however, submitted cost studies that contain identical or consistent inputs and assumptions across all elements. For example, Verizon did not optimize inputs and outputs between its switching and loop cost studies,[979] and AT&T/WorldCom propose using the MSM for some UNEs and Verizon's cost studies for others.[980]

B. Shared Cost Allocation Between End-Office and Tandem Switching Functions

374. In the Verizon switching cost study, nine of the switches are combined end-office and tandem switches.[981] All other switches are either exclusively end-office switches or exclusively tandem switches.[982] In order to calculate end-office and tandem switching costs, we must determine the appropriate allocation of costs that are shared between end-office switching

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975 *See id.* at 21355-56, paras. 77-78.

976 AT&T/WorldCom Ex. 12, at 97; AT&T/WorldCom Ex. 24 (Pitts Supplemental Surrebuttal), at 18-19.

977 *See* 47 C.F.R. § 51.505(a)-(c).

978 *See* 47 C.F.R. § 51.505(b).

979 Tr. at 4141-42.

980 *See infra* sections VI(A), IX.

981 Verizon Ex. 125 (Matt Supplemental Surrebuttal), Attach. H. Each combined switch in the Verizon study is a Lucent 5ESS switch. *Id.*

982 *See id.*

SM.[914] In so doing, however, the Commission expressly stated that switching costs are less significant than loop costs for universal service purposes,[915] and therefore it devoted less analysis to the switching and interoffice platforms and cost inputs than would have been necessary for purposes of determining unbundled switching and transport costs.[916]

A. Cost Model

1. Positions of the Parties

359. Verizon submitted cost studies to determine the costs of, and thereby the rates for, unbundled end-office and tandem switching.[917] The starting point in the Verizon switching cost study is the SCIS model.[918] The SCIS model is a computer system that has two modules, SCIS/Model Office (SCIS/MO) and SCIS/Intelligent Network (SCIS/IN).[919] The SCIS/MO module is used to develop switching investments and processor-related investments associated with features that do not require any specific, unique hardware.[920] The SCIS/IN module is used to develop incremental investments associated with vertical features.[921] Verizon uses the SCIS model to estimate the initial capital outlay for the physical material of the end-office and tandem switching equipment.[922]

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[914] *Id.* at 21354-57, paras. 75-80. HAI 5.0 uses a single cost module to determine both switching and transport costs. *See id.* at 21354, para. 74. In the universal service proceeding, the Commission adopted this module for use in determining switching and common transport costs. *See id.* at 21354-57, paras. 75-80; *see also infra* section VI(A).

[915] *Platform Order*, 13 FCC Rcd at 21355, para. 75 ("In our evaluation of the switching modules in this proceeding, we note that, for universal service purposes, where cost differences caused by differing loop lengths are the most significant cost factor, switching costs are less significant than they would be in, for example, a cost model to determine unbundled network element switching and transport costs.").

[916] *Compare Platform Order*, 13 FCC Rcd at 21353-57, paras. 71-80 (switching and interoffice platform), *with id.* at 21335-53, paras. 26-70 (loop platform); *compare Inputs Order*, 14 FCC Rcd at 20277-99, paras. 286-337 (switching and interoffice cost inputs), *with id.* at 20172-277, paras. 33-285 (loop cost inputs).

[917] Verizon Ex. 100P, Vols. V, VI, IX (confidential version); Verizon Ex. 125P (Matt Supplemental Surrebuttal), Attach. A-G (confidential version); Verizon Ex. 161P (Matt Second Supplemental Surrebuttal), Attach. H-M (confidential version). Verizon submitted the Telcordia Common Channel Signaling Cost Information System (CCSCIS) study to determine signaling costs and rates. *See* Verizon Ex. 100P, Vol. VII, Parts E-1 and E-2 (confidential version).

[918] Verizon Ex. 107P, at 179-211 (confidential version).

[919] *Id.*

[920] *Id.*

[921] *Id.*

[922] *Id.*

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370. Technological improvements in switches, moreover, increase the importance of using recent data to determine switching costs. A new switch purchased today can provide more optional or "vertical" features than can the switches reflected in the MSM's sample data. According to Verizon, in the mid-1990s switches included only four vertical features: call waiting, call forwarding, three-way calling, and speed dialing.[965] The Verizon study, in contrast, includes costs for switches that are capable of providing scores of vertical features.[966] There are costs associated with the switch hardware and software required to provide vertical features that should be included in the cost study.[967] The regression equation on which the MSM switch cost inputs are based does not explicitly include a variable for vertical feature costs. Although the regression analysis includes time trend variables intended to capture the effect of time on switch costs,[968] the record does not support a finding that a cost estimate reflecting prices for switches installed between 1989 and 1996, which included relatively few vertical features (and for which there were likely few subscribers), would adequately reflect forward-looking switch costs. Such costs include a considerably larger number of vertical features (and for which there are likely a relatively larger number of subscribers).[969]

371. Similarly, the Verizon switching cost study explicitly includes costs associated

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[965] *Id.* at 5334, 5341-42.

[966] The same vertical feature, however, is included more than once in Verizon's tally of vertical features because some may be offered in connection with more than one service. Verizon Ex. 100P, Vol. VI, section 15, subsection 5.8, Features List at 2 (confidential version); Verizon Ex. 125P, Attach. B-1 (confidential version). The number of distinct vertical features that Verizon offered at the time of the hearing, nevertheless, is substantially greater than the number offered in the mid-1990s.

[967] We expect that these costs will increase as the number of vertical feature subscribers increases. Verizon presumably would need to design its switches to reflect anticipated demand for vertical features.

[968] *Inputs Order*, 14 FCC Rcd at 20287-89, paras. 311-14.

[969] Of the 946 switches in the sample on which the MSM Switching/Transport module is based, only 4 are host or stand alone switches that were installed in 1996, and only 22 are host or stand alone switches that were installed in 1995. *See id.* at 20279, para. 290. (We determined the number and timing of the observations comprising the SM's switch sample through review of these data, which are in the custody of the Bureau's Industry Analysis and Technology Division.) Costs for at least some vertical features are not reflected in the data for remote switches because a remote switch relies on a host switch to provide some vertical feature capability. Thus, the quantity and the quality of the information regarding vertical features switch costs reflected in the more recent 1995-96 observations are limited. In other words, whatever information on vertical feature costs that is reflected in the sample derives primarily from the 1989-1994 data. This compounds our concern that the regression equation does not account for today's vertical feature costs.

compliant end-office and tandem switching rates and signaling rates.[931] The MSM contains a switching and transport module.[932] End-office switching costs in the MSM are based primarily on the regression analysis adopted by the Commission in the universal service proceeding.[933] There, the Commission analyzed the costs for end-office switching equipment using data from switch installations from 1989-1996.[934] It determined that the fixed cost for a host switch and a stand-alone switch was $486,700 and that the fixed cost for a remote switch was $161,800.[935] It further found that the variable cost for host, stand-alone, and remote switches was $87 per line.[936] Given these cost inputs, end-office switching costs in the MSM depend almost entirely on the number of lines per switch and the relative numbers of host, stand-alone, and remote switches in a network. The Switching/Transport module contains capacity checks, based on the number of lines, busy hour call attempts, and busy hour usage,[937] but these checks have minimal effect on the switching cost estimates generated by the MSM. AT&T/WorldCom also rely on the costs and calculations contained in the underlying SM to generate costs and rates for tandem switching.[938]

363. Verizon challenges the use of the MSM Switching/Transport module as fundamentally inappropriate for use in generating UNE rates, and it claims that many of the module's cost inputs are flawed as well. As a threshold matter, Verizon contends that the Switching/Transport module adopted by the Commission to determine switching costs for federal universal service purposes is inappropriate for use in developing absolute unbundled switching rates in Virginia.[939] Verizon asserts that, in the universal service proceeding, the Commission focused not on whether the calculations provided an accurate estimate of TELRIC switching costs, but rather on whether the module functioned sufficiently to calculate federal universal service switching costs.[940] Verizon claims that AT&T/WorldCom have done nothing in

[931] AT&T/WorldCom Ex. 14, Attach. A; AT&T/WorldCom Ex. 23, Attach. A, J.

[932] AT&T/WorldCom Ex. 14, Attach. A; AT&T/WorldCom Ex. 23, HAI Model Release 5.0a at 53-63 (1998) ("Switching/Transport module"); AT&T/WorldCom Initial Cost Brief at 188. Although AT&T/WorldCom filed a revised version of the Switching/Transport module later in the proceeding to update certain common transport costs, *see* Keffer Dec. 12 Letter, Install A, the general model descriptions provided in the initial cost model filing remain accurate.

[933] *Inputs Order*, 14 FCC Rcd at 20279-93, paras. 290-323.

[934] *Id.* at 20281-91, paras. 296-319.

[935] *Id.* at 20281, para. 296.

[936] *Id.*

[937] AT&T/WorldCom Ex. 23, HAI Model Release 5.0a at 56-57.

[938] *See* AT&T/WorldCom Ex. 23, Attach. A, J.

[939] Verizon Ex. 109, at 47-50.

[940] Verizon Switching Cost Brief at 26 (citing *Platform Order*, 13 FCC Rcd at 21354-56, paras. 75, 78).

wire center).[950] In practice, however, Verizon notes that switches and switch components come in discrete sizes and cannot be customized to match exactly the demand in a particular wire center.[951] Therefore, according to Verizon, just as breakage requires the deployment of some excess capacity in the context of cables,[952] carriers will similarly incur the cost of some amount of excess switching capacity.[953] Verizon argues, however, that the MSM is incapable of accounting for these and other types of engineering realities.[954]

366. Verizon also asserts that the MSM cannot accurately account for peak period usage. In developing the SM, the Commission stated that a cost model must "ensure that adequate capacity exists in that switching facility to process all customers' calls that are expected to be made at peak periods."[955] Verizon argues, however, that the MSM fails to satisfy this basic criterion because it does not account for the fact that each central office and its associated trunking network experience an annual busy season, as well as a daily busy hour, characterized by periods of peak traffic loads.[956] Rather, the Switching/Transport module provides capacity for the same number of busy hour calls each day of the year without accounting for a busy season.[957] The uniform amount of usage that AT&T/WorldCom posit as peak traffic cannot, Verizon claims, account for peak periods resulting from seasonal fluctuations in demand, such as a resort community for which the bulk of the yearly traffic occurs over a few summer months.[958] As a result, Verizon asserts that the MSM models switches that would be incapable of handling traffic during busy season periods and, therefore, a network on which customers would experience frequent denials of service.[959]

2. Discussion

367. We adopt the Verizon switching cost study, including the SCIS model, because it

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950 *See* Verizon Switching Cost Brief at 29.

951 Verizon Ex. 109, at 50-52.

952 *See supra* note 675.

953 Verizon Ex. 109, at 50-52; *see also* Verizon Switching Cost Brief at 29.

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955 *Inputs Order*, 14 FCC Rcd at 20164-65, para. 12; *see also id.* at 20277-78, para. 286.

956 *See* Verizon Ex. 109, at 50-52.

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[918] Verizon Ex. 107P, at 179-211 (confidential version).

[919] *Id.*

[920] *Id.*

[921] *Id.*

[922] *Id.*

concluded that the Verizon cost study is superior to the MSM for calculating unbundled switching costs, we place less weight on the relative simplicity of the MSM's Switching/Transport module. Similarly, concerns expressed in the universal service proceeding regarding the SCIS model's use of proprietary data do not arise here.[975] In this proceeding, AT&T/WorldCom and Bureau staff have had access to the Verizon study and its underlying data. Indeed, AT&T/WorldCom were able to re-run the Verizon switching cost study using different input data and thereby to propose restated switching rates.[976]

373. Finally, we have considered the effects of adopting the MSM for loop rates and the Verizon cost study for switching rates and believe that doing so is reasonable in the circumstances before us. In contrast to the relative cost analysis performed in the universal service proceeding, here the TELRIC rules require that we establish rates for each UNE, including switching, based on the costs attributable to that UNE.[977] Rates for a particular UNE are based on the total costs of the element divided by the total demand for the element.[978] Consistency between assumptions and data for the costs and the demand of a particular element is, therefore, crucial to determining the per unit costs of that element. Identity of model assumptions and data between different elements is not essential so long as they otherwise meet our key model criteria. Neither side, however, submitted cost studies that contain identical or consistent inputs and assumptions across all elements. For example, Verizon did not optimize inputs and outputs between its switching and loop cost studies,[979] and AT&T/WorldCom propose using the MSM for some UNEs and Verizon's cost studies for others.[980]

B. Shared Cost Allocation Between End-Office and Tandem Switching Functions

374. In the Verizon switching cost study, nine of the switches are combined end-office and tandem switches.[981] All other switches are either exclusively end-office switches or exclusively tandem switches.[982] In order to calculate end-office and tandem switching costs, we must determine the appropriate allocation of costs that are shared between end-office switching

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975 *See id.* at 21355-56, paras. 77-78.

976 AT&T/WorldCom Ex. 12, at 97; AT&T/WorldCom Ex. 24 (Pitts Supplemental Surrebuttal), at 18-19.

977 *See* 47 C.F.R. § 51.505(a)-(c).

978 *See* 47 C.F.R. § 51.505(b).

979 Tr. at 4141-42.

980 *See infra* sections VI(A), IX.

981 Verizon Ex. 125 (Matt Supplemental Surrebuttal), Attach. H. Each combined switch in the Verizon study is a Lucent 5ESS switch. *Id.*

982 *See id.*

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W CSS/2W BUL	Verizon 2W CSS/2W BUL	% Difference Between ratios
2W BUL			2W CSS					
Cell 1	**4.98**	**17.86**	**Cell 1**	**7.00**	**25.85**	***1.41***	***1.45***	***2.9%***
Cell 2	7.37	26.31	Cell 2	9.49	34.50	*1.29*	*1.31*	***1.8%***
Cell 3	11.77	43.45	Cell 3	13.71	50.95	*1.16*	*1.17*	***0.7%***
AVG.:	6.18	22.33	AVG.:	8.20	30.28	*1.33*	*1.36*	***2.2%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 2W BRI/2W BUL	Verizon 2W BRI/2W BUL	
2W BUL			2W BRI					
Cell 1	*4.98*	*17.86*	Cell 1	5.91	23.14	*1.19*	*1.30*	***8.4%***
Cell 2	7.37	26.31	Cell 2	8.28	31.83	*1.12*	*1.21*	***7.1%***
Cell 3	11.77	43.45	Cell 3	12.65	48.87	*1.07*	*1.12*	***4.4%***
AVG.:	6.18	22.33	AVG.:	7.09	27.66	*1.15*	*1.24*	***7.4%***

	ATT/WC	Verizon		ATT/WC	Verizon	ATT/WC 4W DDS/4W CSS	Verizon 4W DDS/4W CSS	
4W BUL - CSS			4W DDS					
Cell 1	19.69	56.81	Cell 1	21.77	60.29	*1.106*	*1.061*	***-4.2%***
Cell 2	24.80	74.19	Cell 2	27.52	78.99	*1.110*	*1.065*	***-4.2%***
Cell 3	32.55	106.49	Cell 3	36.14	113.18	*1.110*	*1.063*	***-4.5%***
AVG.:	22.01	65.50	AVG.:	24.37	69.67	*1.107*	*1.064*	***-4.1%***

355. By way of example, if we apply the ratio analysis and use the ratios generated from the Verizon proposed rates, we would calculate the 2-wire CSS loop rate (see first line of the table above, in bold) for zone 1 by multiplying the basic 2-wire loop rate, zone 1, by 1.45. Were we instead to use the ratios generated from the AT&T/WorldCom restatement rates, we would use a ratio of 1.41 instead of 1.45. In this instance, using the ratio based on the Verizon proposed rates instead of the AT&T/WorldCom restatement rates would generate a 2.9 percent higher 2-wire CSS loop rate (for zone 1).

356. To complete this analysis, we must determine whether to use the ratios generated from the Verizon proposed rates or the AT&T/WorldCom proposed restatement rates. Electronics costs comprise a significant proportion of loop costs, and one of the major cost drivers for electronics is the type of DLC systems used. In determining basic 2-wire loop costs, we concluded that fiber-based loop feeder plant should use 100 percent NGDLC systems.[907] Because we adopt AT&T/WorldCom's position on that issue, and because electronics are a significant loop cost driver, we will use the ratios that result from the AT&T/WorldCom restatement rates rather than from the Verizon proposed rates. In reaching this conclusion, we note that the difference between the AT&T/WorldCom and Verizon ratios (the last column in the table, above) is generally small (less than five percent for all three loop types in all density zones, except for the 2-wire ISDN BRI loop type in zones 1 and 2). We further note that,

[907] *See supra* section IV(C)(2)(k).

the number of lines by four) in this allocation.[993] They also contend that SS7 link investments are limited to trunks and therefore should be allocated based on the relative number of end-office trunk ports and tandem trunk ports.[994]

2. Discussion

377. We adopt Verizon's approach to allocating costs that are shared between end-office and tandem switching functions. As a preliminary matter, we note that the effect of using AT&T/WorldCom's proposed allocation factors instead of Verizon's would be fairly minimal. AT&T/WorldCom estimate that use of their allocation factors would reduce Verizon's end-office switch costs by only four percent.[995]

378. Verizon's approach is preferable for several reasons. First, as we explain *infra* in the end-office switching rate structure section, we require Verizon to recover end-office switching costs, including "getting started," EPHC, and SS7 link costs, on a flat, per line basis, and not on a per MOU basis.[996] Any "getting started," EPHC, and SS7 link costs shared between tandem and end-office switch functions that are allocated to tandem switching would, however, under the parties' proposed tandem rate structures, be recovered on a per MOU basis. Second, recovery of these shared costs through either element will permit total element cost recovery and should not affect the total payments made by competitive LECs. Because the shared costs that AT&T/WorldCom propose allocating to tandem switching would equal precisely the shared costs that would be allocated away from end-office switching, and because we expect that competitive LECs that purchase unbundled end-office switching are also likely to purchase unbundled tandem switching, competitive LEC payments for these two switching elements

(Continued from previous page)

[992] Line concentration enables a LEC to reduce the number of DS-1 feeder facilities necessary by assigning a feeder transmission path as a telephone call is made instead of dedicating a specific channel in the feeder plant to a particular line at all times. *See* Verizon Ex. 122, at 183-85; Verizon Switching Cost Brief at 14. Concentration is possible because not all callers use the telephone at the same time.

[993] AT&T/WorldCom Ex. 24, at 12 n.18. In their restatement of the Verizon studies, AT&T/WorldCom allocate "getting started" and EPHC investments to end-office switching and tandem switching, respectively, based on the following formulas: ((lines/4) + local trunks)/((lines/4) + local trunks + tandem trunks) and tandem trunks/((lines/4) + local trunks + tandem trunks). They apply these allocation factors to 5ESS end-office switch and combined end-office/tandem switch investment. They do not apply these factors to Nortel or Siemens switch investment because none of the Nortel or Siemens switches is a combined end-office/tandem switch. *Id.*; *see also infra* section V(C)(3).

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[995] *See id.* at 12.

[996] *See infra* section V(D).

or 4-wire digital data services (DDS) loop types. Verizon proposes to establish rates for these loop types using its loop cost studies.[900] Other than providing general descriptions of these loop types,[901] Verizon fails to offer any testimony or other evidence to explain its cost studies for these loop types or to support the inputs and assumptions reflected therein. AT&T/WorldCom do not offer any affirmative proposal to establish rates for these loop types. They provide detailed testimony challenging many of the inputs and assumptions used by Verizon in its LCAM study generally, which apply to all loop types, but they do not offer any challenges specific to these loop types.[902]

b. Discussion

350. Neither Verizon nor AT&T/WorldCom offer feasible proposals to establish TELRIC rates for these loop types. Both proposals rely on the LCAM, and, as we explain below, using the LCAM to establish rates for the 2-wire CSS, 2-wire ISDN BRI, and 4-wire DDS loops presents significant problems. To avoid these problems, we adopt rates for these loops based on cost ratios (as opposed to absolute values) derived from the LCAM.

351. Relying on the LCAM (including its inputs and model algorithms) for these three loop types, as the parties suggest, while using the MSM (including its inputs and model assumptions) as the basis to establish rates for other loop types admittedly raises significant issues regarding data mismatches. Simply put, the cost inputs and algorithms vary greatly between the cost models. The parties fail to provide sufficient evidence to enable us to resolve these problems. Neither side devotes any significant testimony or briefing to issues specific to these loop types. Verizon includes a skeletal summary of what these loop types are, and AT&T/WorldCom include a single paragraph of testimony that points the reader to their workpapers.[903] In order for us to establish rates for these loop types, we would therefore need to modify the LCAM to ensure its consistency with the MSM without any meaningful assistance from the parties. This we decline to do.

352. We note, moreover, that we do not expect there to be any significant demand for at least the 2-wire CSS and 4-wire DDS loops. These two loop types represent very old technologies. CSS should be necessary only where signaling system 7 (SS7) networks have not been deployed. DDS lines should be necessary only to support certain very old and slow modems (*e.g.*, early digital 2400 kbps modems). Arguably, because neither of these loop types represents the most efficient technology currently available, we should not be establishing separate rates for these loop types.

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[900] *See* Verizon Ex. 100P, Vols. II-III, Parts B-2 (2-wire CSS), B-4 (2-wire ISDN BRI), and B-5 (4-wire DDS) (confidential version).

[901] Verizon Ex. 107, at 81-82.

[902] *Compare* AT&T/WorldCom Ex. 12, at 19-79, *with* AT&T/WorldCom Ex. 12, at 94-95.

[903] Verizon Ex. 107, at 81-82; AT&T/WorldCom Ex. 12, at 95-96. Although AT&T/WorldCom attempt to restate all of Verizon's loop rates, they acknowledge that they have not proposed all of the necessary adjustments. *See* AT&T/WorldCom Ex. 12, at 10, 12, 16, 19, 36.

382. Verizon states that its proposed switching costs properly reflect the best available estimate of the discounts that Verizon would receive as it incrementally upgrades and expands its network and that they are therefore appropriate for use in determining its forward-looking switching costs.[1002] Verizon bases the discount it uses in the SCIS model for the Lucent 5ESS switch and the Siemens EWSD switch on the discount it received on year 2000 purchases.[1003] It bases the discount for the Nortel DMS-100 and DMS-200 switches on the discount reflected in its current contract with Nortel and the purchases Verizon expects to make under this contract.[1004] Verizon's proposed discounts reflect almost entirely the discounts it receives on additions to existing switches (the "growth discount," as opposed to the "new switch discount"), because the purchases on which the proposed discounts are based are almost entirely for switch growth and upgrade equipment.[1005] Verizon argues that AT&T/WorldCom's proposed all-new switch discount is unrealistic and has been previously rejected by this Commission, the D.C. Circuit, and state commissions as inconsistent with TELRIC principles.[1006]

383. AT&T/WorldCom argue that the Commission's TELRIC pricing rules require the use of the most efficient technology and thus assume the deployment of new switching equipment.[1007] Therefore, they argue that the new switch discount is the appropriate discount for calculating the cost of this equipment.[1008] Furthermore, although the discounts that vendors give for purchasing a new switch historically have been greater than the discounts for add-on equipment or growth to an existing switch, AT&T/WorldCom assert that, more recently, Verizon has filed testimony in a variety of proceedings stating that the discounts it now receives for growth equipment have deepened and are roughly the same as the discounts for a new switch.[1009] Thus, AT&T/WorldCom argue that it is reasonable to rely entirely on new switch discounts when developing switch costs in this proceeding.

384. In contrast to the extensive record developed concerning end-office switching, the

[1002] Tr. at 5230, 5235; Verizon Switching Cost Brief at 4. Verizon's proposed discounts and supporting data for the Lucent 5ESS switch and Nortel DMS-100 and DMS-200 switches are set out in its cost studies. *See* Verizon Ex. 100P, Vol. IX, Tab VA Switch Discount Support, Exhibit Part C-P1 and Part C-P2 (confidential version). Its proposed discount and supporting data for the Siemens EWSD switch are set out in Verizon Ex. 122P (Recurring Cost Panel Surrebuttal), Attach. O (confidential version).

[1003] Verizon Ex. 122, at 166-67.

[1004] *Id.* at 167.

[1005] *See id.*; Verizon Ex. 125P, Attach. D (confidential version); Verizon Ex. 212P (Verizon response to record request no. 28 (requested Nov. 28, 2001)) (confidential version).

[1006] Verizon Switching Cost Brief at 6-7, 9-10 (citing *AT&T Corp. v. FCC*, 220 F.3d at 618).

[1007] AT&T/WorldCom Switching Cost Brief at 5-7; AT&T/WorldCom Reply Cost Brief at 82.

[1008] AT&T/WorldCom Switching Cost Brief at 6-7; AT&T/WorldCom Reply Cost Brief at 82.

[1009] AT&T/WorldCom Reply Cost Brief at 82.

rates (from the LCAM) are similar to those they propose. Specifically, using Verizon's proposed statewide average 2-wire, DS-1, and DS-3 loop rates, the ratios are 6.1 and 10.0, respectively. In addition, in the *Access Charges Reform First Report and Order*, the Commission found that the ratio of outside plant (*i.e.*, loop) costs for PRI ISDN lines[889] to basic analog lines was approximately 5 to 1.[890] The Commission based this determination on cost studies submitted by Bell Atlantic, Ameritech, Pacific Bell, and US West.[891] The Bell Atlantic study (which included Virginia) alone, moreover, showed a 4.13 to 1 ratio.[892]

343. Because we are using the MSM to generate 2-wire loop rates,[893] we do not consider using the LCAM to establish DS-1 loop rates or the Verizon High Capacity Access Cost (Hi-Cap) model to establish DS-3 loop rates. The MSM and the LCAM and Hi-Cap models are fundamentally different models that use widely varying assumptions and inputs that are not possible to reconcile with any reasonable degree of confidence. Using these different models to determine the costs of different loop types would, therefore, invariably result in Verizon either over- or under-recovering its total outside plant costs, and thus violate the Commission's TELRIC rules.[894]

344. Although we use AT&T/WorldCom's cost factors to determine the DS-1 and the DS-3 loop rates, we agree with Verizon that AT&T/WorldCom create total cost and cost allocation problems by using different DS-0 equivalent computations (4.3:1 and 9.6:1) to determine DS-1 and DS-3 loop rates than they use to determine the DS-0 loop rates (24:1 and 28:1). As we explain in

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[889] We assume, for purposes of this arbitration, that PRI ISDN loop costs and DS-1 loop costs are the same because Verizon submits a single cost study, establishing a single set of rates, for DS-1 loops and for PRI ISDN loops. For this same reason, although AT&T/WorldCom do not offer testimony specific to PRI ISDN loop costs, we find that the rates for the PRI ISDN type loop shall be the same as those we establish herein for the DS-1 loop type.

[890] *See Access Charge Reform*, CC Docket Nos. 96-262, 94-1, 91-213, 95-72, First Report and Order, 12 FCC Rcd 15982, 16028-34, paras. 111-22 (1997) (*Access Charge Reform First Report and Order*) (using this cost ratio to cap at 5 the number of end-user common line charges (*i.e.*, subscriber line charges or SLCs) that may be assessed by price cap carriers for a PRI ISDN service). The Commission relied on this decision in extending the rule to non-price cap carriers in 2001 in the MAG Order. *Multi-Association Group (MAG) Plan for Regulation of Interstate Services of Non-Price Cap Incumbent Local Exchange Carriers and Interexchange Carriers*, CC Docket Nos. 00-256, 96-45, 98-77, 98-166, Second Report and Order and Further Notice of Proposed Rulemaking in CC Docket No. 00-256, Fifteenth Report and Order in CC Docket No. 96-45, and Report and Order in Docket Nos. 98-77 and 98-166, 16 FCC Rcd 19613, 19640-41, para. 56 (2001) (*MAG Order*).

[891] *Access Charge Reform First Report and Order*, 12 FCC Rcd at 16030-33, paras. 113-20. The Commission excluded the cost study submitted by NYNEX, which showed a higher ratio, because it was determined to be an outlier. *Id.* at 16030-31, para. 113.

[892] *Id.* at 16030-31, para. 113.

[893] *See supra* section IV(B)(2).

[894] *See* 47 C.F.R. § 51.505(a-b).

387. Accordingly, as a threshold matter, we conclude that TELRIC-based switch costs should reflect switch manufacturer prices for both new equipment and growth equipment; therefore, we reject both Verizon's proposed discount (based largely on growth additions) and AT&T/WorldCom's proposed discount (based entirely on new switch purchases). This limited departure from baseball arbitration is consistent with Commission precedent regarding switch discounts in the context of section 271 applications. Upon consideration of arguments similar to those presented here, the Commission found that an assumption of 100 percent growth additions is inconsistent with TELRIC principles, but it also rejected arguments that the TELRIC rules require an assumption of 100 percent new switches.[1015]

388. In order to implement this conclusion, we require Verizon to use in the SCIS model three separate vendor discounts to model costs attributable to end-office switching, as set forth in sections V(C)(1)(b)(i)(a), V(C)(1)(b)(ii)(a), and V(C)(1)(b)(iii), below. First, we will use the discounts that Verizon currently receives on new switches in order to calculate "getting started" investment.[1016] Second, we will use a weighted average discount reflecting Verizon's current discount on new switches and growth equipment in order to estimate switch investment other than "getting started," trunk port, and SS7 link investment. Third, we will use a separate discount for end-office switching investment attributable to trunk ports and SS7 links.

389. We must also develop vendor discounts for new switches and growth equipment for use in the SCIS model to develop tandem switching costs. Based on the record before us, we conclude that the appropriate discounts for tandem switching costs are similar to the discounts for end-office switching.[1017] For tandem switching, however, we conclude that we need only two discounts. We will use the discounts that Verizon currently receives on new switches for tandem switching "getting started" investment. We will use a weighted average discount reflecting Verizon's current discounts on new switches and growth equipment for estimating tandem switch investment, other than "getting started" investment.

(Continued from previous page)
Alabama, Kentucky, Mississippi, North Carolina, and South Carolina, WC Docket No. 02-150, Memorandum Opinion and Order, 17 FCC Rcd 17595, 17635, para. 83 (2002) (*BellSouth Multistate 271 Order*) (levels of new and growth switch discounts reflect vendors' judgments about anticipated purchases); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059, para. 81 (vendor discounts are valid only when an overall purchase of both new and growth equipment is made).

[1015] *See, e.g., Rhode Island 271 Order*, 17 FCC Rcd at 3318, para 34 (The Commission "strongly question[ed]" an assumption of 100 percent growth additions. "Although an efficient competitor might anticipate some growth additions over the long run, rates based on an assumption of all growth additions and no new switches do not comply with TELRIC principles."); *Georgia/Louisiana 271 Order*, 17 FCC Rcd at 9059-60, para. 82 (rejecting AT&T's claim that the use of a mix of new and growth switch purchases in a cost model may never be used to determine forward-looking costs, because it may not be cost-effective to acquire all of the projected need at the outset).

[1016] As we explain *supra* note 988, the "getting started" equipment is the central processor, memory, maintenance, administrative, test, and spare equipment, and other common equipment.

[1017] *See, e.g.*, Verizon Ex. 107, at 194.

c. DS-1 and DS-3 Loops

(i) Positions of the Parties

338. AT&T/WorldCom calculate DS-1 and DS-3 loop costs by determining the cost relationship between these loops and the basic 2-wire loop.[871] To do so, they first determine, based on Verizon ARMIS data,[872] that the average number of DS-0 equivalents per physical, non-switched DS-1 and DS-3 lines is approximately 8.0.[873] Because the 8:1 ratio includes a mix of DS-1s and DS-3s, AT&T/WorldCom then determine the ratios for DS-1s and DS-3s individually.[874] Relying on the Commission's *Transport Rate Structure Order*, AT&T/WorldCom assume that the DS-3:DS-1 cost ratio is 9.6:1.[875] AT&T/WorldCom also assume that 90 percent of non-switched lines are DS-1s and 10 percent are DS-3s.[876] Applying these two relationships, AT&T/WorldCom calculate DS-1 costs to be 4.3 times DS-0 costs and DS-3 costs to be 41.3 times DS-0 costs (*i.e.*, 9.6 times DS-1 costs).[877]

339. Verizon urges us to reject AT&T/WorldCom's DS-1 and DS-3 loop cost calculations. Verizon contends that AT&T/WorldCom improperly use a different DS-0 equivalent factor in determining the DS-1 and the DS-3 loop rates than they use to determine the 2-wire loop rates. Specifically, AT&T/WorldCom use a 12:1 DS-0 to DS-1 ratio and a 9.6:1 DS-3 to DS-1 ratio to determine DS-1 and DS-3 loop costs, while using a 24:1 DS-1 to DS-0 ratio and a 28:1 DS-3 to DS-1 ratio in their proposed DS-0 loop cost calculations.[878] Verizon also asserts that AT&T/WorldCom fail to provide support for their 12:1 DS-1 to DS-0 ratio or their 9:1 ratio of DS-3s to DS-1s,[879] and that they fail to account for sufficient investment for DS-1 electronics.[880] Finally,

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[871] AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[872] AT&T/WorldCom claim that they rely on 2002 ARMIS data. *See* AT&T/WorldCom Ex. 1, at 25 n.28; AT&T/WorldCom Ex. 23, Vol. 1 at 12 n.8. ARMIS data for 2002 (and 2001) were not available at the time of the hearing. We believe it likely that, if AT&T/WorldCom relied on ARMIS data, they used 2000 ARMIS data, and assume so in our analysis.

[873] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[874] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 11-12.

[875] *See Transport Rate Structure and Pricing*, CC Docket No. 91-213, Third Memorandum Opinion and Order on Reconsideration, 10 FCC Rcd 3030, 3039, 3049, 3062, paras. 13, 33-34, 62-63 (1994) (*Transport Rate Structure Order*).

[876] AT&T/WorldCom Ex. 1, at 25; AT&T/WorldCom Ex. 23, Vol. 1 at 12.

[877] AT&T/WorldCom Ex. 1, at 25-26; AT&T/WorldCom Ex. 23, Vol. 1 at 12. Specifically, AT&T/WorldCom's formulas are: (90% * 4.3) + (10% * 4.3 * 9.6) = 8. (4.3 * 9.6) = 41.3. In the first formula, AT&T/WorldCom solve for the 4.3. AT&T/WorldCom Ex. 1, at 26 n.29.

[878] Verizon Ex. 109, at 42-44; Verizon Reply Cost Brief at 138-40.

[879] Verizon Ex. 109, at 43-44.

[880] *Id.* at 37.

need not be replaced over the life of the switch.[1027] Finally, the SCIS model user guide indicates that the "getting started" costs for the switch technology in the Verizon study that accounts for most of the investment and most of the lines are independent of both usage and the number of lines.[1028]

392. Verizon does provide examples of components of the "getting started" equipment that it has replaced or augmented over the life of the switch.[1029] Verizon fails, however, to provide empirical evidence to quantify the extent to which it has grown or replaced the "getting started" components of the switch. It does not, for example, provide any evidence to support an estimate of the percentage of overall investment in the "getting started" components of a modern switch that would be installed initially and the percentage that would be installed subsequent to the initial installation date. These examples therefore do not undermine the other record evidence that supports the conclusion that the new switch discount is appropriate for estimating the "getting started" investment.

393. Moreover, whatever the extent to which "getting started" equipment is replaced or augmented, Verizon acknowledges that a primary reason for doing so is to upgrade the switch, not to accommodate growth, especially for the Lucent 5ESS switch, which comprises the majority of Verizon's switch investment.[1030] To the extent that "getting started" equipment is augmented or replaced for reasons other than growth, use of a discount other than the new switch discount to develop "getting started" investment would result in rates that recover from current subscribers costs for future upgrades from which they receive no benefit today.

394. Finally, Verizon's experience with regard to replacing or augmenting "getting started" equipment derives in part from switches that were installed many years ago and that have had lives exceeding those that may be expected for a modern digital switch installed today, the starting point for developing forward-looking costs. That is, a switch installed today may never reach the age of a number of Verizon's existing switches. We recognize that a modern digital switch installed today may have a relatively shorter life by prescribing a 12-year switch life as the basis for calculating depreciation expense.[1031] This 12-year life is at the low end of the Commission's safe-harbor range and likely is shorter than one that we would have prescribed for developing unbundled switching prices several years ago. Given that a digital switch installed today would have a shorter life than one installed years ago, we also would expect that

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[1027] *Id.*

[1028] AT&T/WorldCom Ex. 24P (Pitts Supplemental Surrebuttal), at 16-17 (confidential version); *see also* Verizon Ex. 123, at 6 (stating that SCIS models "the investment for processor-related equipment and other equipment independent of switch size (*i.e.*, lines and trunks) and traffic").

[1029] Verizon Ex. 122, at 175.

[1030] *Id.* at 178; Tr. at 5434-38, 5440-41 (for example, carriers might add processing capacity over time to run application software that supports advanced features or to accommodate new regulatory mandates, such as LNP).

[1031] *See supra* section III(D)(3).

b. 4-wire Loops

(i) Positions of the Parties

334. AT&T/WorldCom derive the 4-wire loop rate by multiplying the 2-wire loop rate by a factor of 1.7. To arrive at this factor, AT&T/WorldCom adjust the basic 2-wire loop costs by: (1) increasing the NID costs to account for an additional overvoltage protector ($0.03 per month increase in the NID costs); (2) doubling distribution costs to account for the second 2-wire pair; (3) doubling the SAI costs; and (4) increasing total DLC costs by 40 percent.[857] Fiber feeder costs remain unchanged.[858]

335. Verizon contends that these adjustments to the 2-wire loop costs fail to capture the cost differences between the 2-wire loop and the 4-wire loop. First, because AT&T/WorldCom start with their proposed costs for the 2-wire loop, the 4-wire loop costs incorporate all the errors that Verizon attributes to the 2-wire loop costs.[859] Second, Verizon asserts that AT&T/WorldCom compound this problem by making additional errors specific to the 4-wire loop. For example, because 4-wire services generally are provisioned to businesses that have inside terminals instead of NIDs, AT&T/WorldCom inappropriately factor in higher NID costs rather than using the costs of the necessary inside terminals.[860] Verizon also claims that DLC costs should be increased by a factor of four, rather than 40 percent, to account for the additional DLC equipment necessary because, unlike 2-wire loops, 4-wire loops are unable to take advantage of GR-303 DLC concentration capabilities.[861] Finally, Verizon argues that AT&T/WorldCom fail to increase the component common equipment cost allocation by the two to four times necessary to account for the additional plug-in shelves that 4-wire loops require[862] and fail to propose deaveraged rates.[863]

336. AT&T/WorldCom respond that Verizon's contentions are misplaced. First, they claim that they properly establish the 2-wire loop costs.[864] Second, they point out that Verizon's own cost study uses a NID to calculate 4-wire loop costs.[865] Third, they contend that the 2-wire loop costs they propose do not include the concentration functionality, thus there is no need to account for

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857 AT&T/WorldCom Ex. 1, at 23-24; AT&T/WorldCom Ex. 23, Vol. 1 at 10-11, Attach. J.

858 AT&T/WorldCom Ex. 1, at 24; AT&T/WorldCom Ex. 23, Vol. 1 at 11.

859 Verizon Ex. 109, at 38-39; Verizon Reply Cost Brief at 145.

860 Verizon Ex. 109, at 40.

861 *Id.* at 40-42.

862 *Id.*; *see also* Verizon Reply Cost Brief at 145.

863 Verizon Ex. 109, at 42.

864 AT&T/WorldCom Ex. 14, at 49.

865 *Id.* at 50; AT&T/WorldCom Initial Cost Brief at 167-68.